JC18 Rec'd PCT/PTO 20 APR 2001

SUBSTITUTE FORM PTO-1390 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER
12406-017001

U.S. APPLICATION NO. (If Known, see 37 CFR 1.5) 09/830038

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/DE00/03290	21 September 2000	21 September 1999

TITLE OF INVENTION
ELECTRONIC COMPONENT AND COATING MEDIUM

APPLICANT(S) FOR DO/EO/US
Klaus Höhn and Günter Waitl

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to promptly begin national examination procedures (35 U.S.C. 371(f)).
4. ☐ The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is attached hereto (required only if not communicated by the International Bureau).
   b. ☐ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
8. ☐ An English language translation of amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 16 below concern other documents or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☐ Other items or information:

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JC02 Rec'd PCT/PTO 2 0 APR 2001

U.S. APPLICATION NO. (IF KNOWN) 09/830038	INTERNATIONAL APPLICATION NO. PCT/DE00/03290	ATTORNEY'S DOCKET NUMBER 12406-017001

17. ☒ The following fees are submitted:

Basic National Fee (37 CFR 1.492(a)(1)- (5)):

Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1000**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$860**

International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO..... **$710**

International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4)..... **$690**

International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4)..... **$100**

	CALCULATIONS PTO USE ONLY	
ENTER APPROPRIATE BASIC FEE AMOUNT =	$860.00	
Surcharge of **$130** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$0.00	

Claims	Number Filed	Number Extra	Rate		
Total Claims	26 - 20 =	6	x **$18**	$108.00	
Independent Claims	3 - 3 =	0	x **$80**	$0.00	
MULTIPLE DEPENDENT CLAIMS(S) (if applicable)			**+ $270**	$0.00	
TOTAL OF ABOVE CALCULATIONS =				$968.00	
☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				$0.00	
SUBTOTAL =				$968.00	
Processing fee of **$130** for furnishing the English Translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f))				$0.00	
TOTAL NATIONAL FEE =				$968.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$0.00	
TOTAL FEES ENCLOSED =				$968.00	
				Amount to be refunded:	$
				Charged:	$

a. ☒ A check in the amount of $968.00 to cover the above fees is enclosed.
b. ☐ Please charge my Deposit Account No. 06-1050 in the amount of $0.00 to cover the above fees. A duplicate copy of this sheet is enclosed.
c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 06-1050. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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28,933
REGISTRATION NUMBER

Attorney's Docket No.: 12406-017001 / 1999 P2843 US N

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Klaus Höhn et al. Art Unit : Unknown
Serial No. : Unassigned Examiner : Unknown
Filed : Herewith
Title : ELECTRONIC COMPONENT AND COATING MEDIUM

Box PCT
Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Prior to examination, please amend the application as follows:

In the claims:

Amend claims 3-7, 11, 13-15, 21, and 23-26 as follows:

1. (Reiterated) Electronic component, particularly a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1), with a plastic housing (10) that includes at least one metallic soldering area (4), characterized in that the surface of the plastic housing (10), except for the metallic soldering area (4), is at least partially covered by an anti-solder coating (6).

2. (Reiterated) Electronic component as in Claim 1, characterized in that the anti-solder coating (6) essentially consists of siloxane.

3. (Amended) Electronic component as in Claim 1, characterized in that the anti-solder coating (6) essentially consists of polysiloxane.

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April 20, 2001
Date of Deposit

Samantha Bell
Signature

Samantha Bell
Typed or Printed Name of Person Signing Certificate

4. (Amended) Electronic component as in claim 1, characterized in that the anti-solder coating (6) is essentially based on methyl-polysiloxane.

5. (Amended) Electronic component as in claim 1, characterized in that the anti-solder coating (6) is essentially based on dimethyl-polysiloxane.

6. (Amended) Electronic component as in claim 1, characterized in that the anti-solder coating (6) is essentially based on polyether-modified dimethyl-polysiloxane.

7. (Amended) Electronic component as in claim 1, characterized in that the plastic housing (14) contains a radiation-emitting and/or radiation-detecting semi-conductor element that is embedded in transparent plastic for the emitted and/or received radiation.

8. (Reiterated) Process production of an electronic component, particularly a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1) with a plastic housing (14) that includes at least one metallic soldering area (4), characterized in that only the plastic housing, or a portion of the plastic housing, is covered with an anti-solder coating (6) that essentially consists of siloxane, and that is applied to the plastic housing (14) in a hydrous solution not containing any other additional solvents.

9. (Reiterated) Process according to Claim 8, characterized in that a 0.01 – 5% hydrous solution of the material forming the anti-solder coating (6) is used.

10. (Reiterated) Process according to Claim 9, characterized in that a 0.01 – 2.5% hydrous solution of the material forming the anti-solder coating (6) is used to create as non-adhesive an anti-solder coating as possible.

11. (Amended) Process according to Claim 8, characterized in that the entire surface of the housing (14) including the soldering areas (4) is covered by the hydrous solution, particularly by immersion, spraying, dripping, and/or by means of a sponge or similar.

12. (Reiterated) Process according to Claim 10, characterized in that the exposure time for the coating is between approximately 1 second and approximately 30 seconds.

13. (Amended) Process according to claim 8, characterized in that the hydrous solution is applied at room temperature, and that subsequent drying occurs in air without a thermal post-processing step.

14. (Amended) Process according to claim 8, characterized in that the hydrous solution is used with a phosphate buffer medium at a concentration of from 0.01 mmol/liter to 0.1 mmol/liter.

15. (Amended) Process according to claim 8, characterized in that the hydrous solution includes a fungicide.

16. (Reiterated) Coating medium used to reduce solder splash on surfaces (5) not intended for solder on an electronic component with several surfaces, especially a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1), with a plastic housing (14) that includes at least one metallic soldering area (4), whereby the coating medium (9) is essentially a siloxane.

17. (Reiterated) Coating medium according to Claim 15, whereby the coating medium (9) is a siloxane.

18. (Reiterated) Coating medium according to Claim 16, whereby the coating medium (9) is a methyl-polysiloxane.

19. (Reiterated) Coating medium according to Claim 17, whereby the coating medium (9) is a dimethyl-polysiloxane.

20. (Reiterated) Coating medium according to Claim 18, whereby the coating medium (9) is a polyether-modified dimethyl-polysiloxane.

21. (Amended) Coating medium according to claim 12, whereby the coating medium (9) is dissolved in a 0.01 – 5% hydrous solution without other solvents for application to a surface intended to receive it.

22. (Reiterated) Coating medium according to Claim 20, whereby the hydrous solution contains a phosphate buffer medium at a concentration of from 0.01 mmol/liter to 0.1 mmol/liter.

23. (Amended) Coating medium according to Claim 20, whereby the hydrous solution includes a fungicide.

24. (Amended) Coating medium according to claim 12, whereby the hydrous solution, and as a result, the finished anti-solder coating (6), includes an anti-corrosion medium.

25. (Amended) Coating medium according to claim 12, whereby the hydrous solution has a pH value of between approximately 5.0 and approximately 7.0.

26. (Amended) Coating medium according to claim 12, whereby the hydrous solution, and as a result, the finished anti-solder coating (6), includes a light shielding medium and/or UV absorber, preferably at a concentration up to 1%.--

REMARKS

All amendments have been made to remove multiple dependency while conserving the claimed subject matter. All pending claims, whether amended or merely reiterated, are included herewith. No new matter is added.

Attached is a marked-up version of the changes being made by the current amendment.

Claims 1-26 are now pending. Applicant submits that all of the claims are now in condition for examination, which action is requested. Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: April 29, 2001

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Version with markings to show changes made

In the claims:

Claims 3-7, 11, 13-15, 21, and 23-26 have been amended as follows:

1. (Reiterated) Electronic component, particularly a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1), with a plastic housing (10) that includes at least one metallic soldering area (4), characterized in that the surface of the plastic housing (10), except for the metallic soldering area (4), is at least partially covered by an anti-solder coating (6).

2. (Reiterated) Electronic component as in Claim 1, characterized in that the anti-solder coating (6) essentially consists of siloxane.

3. (Amended) Electronic component as in Claim 1 [or 2], characterized in that the anti-solder coating (6) essentially consists of polysiloxane.

4. (Amended) Electronic component as in [one of the previous Claims] claim 1, characterized in that the anti-solder coating (6) is essentially based on methyl-polysiloxane.

5. (Amended) Electronic component as in [one of the previous Claims] claim 1, characterized in that the anti-solder coating (6) is essentially based on dimethyl-polysiloxane.

6. (Amended) Electronic component as in [one of the previous Claims] claim 1, characterized in that the anti-solder coating (6) is essentially based on polyether-modified dimethyl-polysiloxane.

7. (Amended) Electronic component as in [one of the previous Claims] claim 1, characterized in that the plastic housing (14) contains a radiation-emitting and/or radiation-detecting semi-conductor element that is embedded in transparent plastic for the emitted and/or received radiation.

8. (Reiterated) Process production of an electronic component, particularly a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1) with a plastic housing (14) that includes at least one metallic soldering area (4), characterized in that only the plastic housing, or a portion of the plastic housing, is covered with an anti-solder coating (6) that essentially consists of siloxane, and that is applied to the plastic housing (14) in a hydrous solution not containing any other additional solvents.

9. (Reiterated) Process according to Claim 8, characterized in that a 0.01 – 5% hydrous solution of the material forming the anti-solder coating (6) is used.

10. (Reiterated) Process according to Claim 9, characterized in that a 0.01 – 2.5% hydrous solution of the material forming the anti-solder coating (6) is used to create as non-adhesive an anti-solder coating as possible.

11. (Amended) Process according to Claim 8,[9, or 10,] characterized in that the entire surface of the housing (14) including the soldering areas (4) is covered by the hydrous solution, particularly by immersion, spraying, dripping, and/or by means of a sponge or similar.

12. (Reiterated) Process according to Claim 10, characterized in that the exposure time for the coating is between approximately 1 second and approximately 30 seconds.

13. (Amended) Process according to [one of Claims 8 through 11] claim 8, characterized in that the hydrous solution is applied at room temperature, and that subsequent drying occurs in air without a thermal post-processing step.

14. (Amended) Process according to [one of Claims 8 through 12] claim 8, characterized in that the hydrous solution is used with a phosphate buffer medium at a concentration of from 0.01 mmol/liter to 0.1 mmol/liter.

15. (Amended) Process according to [one of Claims 8 through 13] claim 8, characterized in that the hydrous solution includes a fungicide.

16. (Reiterated) Coating medium used to reduce solder splash on surfaces (5) not intended for solder on an electronic component with several surfaces, especially a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1), with a plastic housing (14) that includes at least one metallic soldering area (4), whereby the coating medium (9) is essentially a siloxane.

17. (Reiterated) Coating medium according to Claim 15, whereby the coating medium (9) is a siloxane.

18. (Reiterated) Coating medium according to Claim 16, whereby the coating medium (9) is a methyl-polysiloxane.

19. (Reiterated) Coating medium according to Claim 17, whereby the coating medium (9) is a dimethyl-polysiloxane.

20. (Reiterated) Coating medium according to Claim 18, whereby the coating medium (9) is a polyether-modified dimethyl-polysiloxane.

21. (Amended) Coating medium according to [one of Claims 12 through 19] claim 12, whereby the coating medium (9) is dissolved in a 0.01 – 5% hydrous solution without other solvents for application to a surface intended to receive it.

22. (Reiterated) Coating medium according to Claim 20, whereby the hydrous solution contains a phosphate buffer medium at a concentration of from 0.01 mmol/liter to 0.1 mmol/liter.

23. (Amended) Coating medium according to Claim 20 [or 21], whereby the hydrous solution includes a fungicide.

24. (Amended) Coating medium according to [according to one of Claims 12 to 22] claim 12, whereby the hydrous solution, and as a result, the finished anti-solder coating (6), includes an anti-corrosion medium.

25. (Amended) Coating medium according to [according to one of Claims 12 to 23] claim 12, whereby the hydrous solution has a pH value of between approximately 5.0 and approximately 7.0.

26. (Amended) Coating medium according to [one of Claims 12 to 24] claim 12, whereby the hydrous solution, and as a result, the finished anti-solder coating (6), includes a light shielding medium and/or UV absorber, preferably at a concentration up to 1%.

1999 P 2843 P

Description

Electronic component and coating medium

The invention relates to an electronic component, particularly to an electro-optical component, with a plastic housing that contains at least one metallic contact surface. It further relates to a coating medium for such a component, and to a method used to produce such a component.

When soldering or unsoldering electronic components, solder splash often accumulates on surfaces not intended for soldering. This presents a particular problem with relatively small SMD components. With electro-optical components, particularly with receiving or transmitting devices such as light-emitting diodes (LED's), for example, solder splash on the housing may affect the function of a light-emitting or receiving semi-conductor component, and may suppress the light or signal output. Unintentional solder bridges may also easily lead to short circuits between closely-positioned connection contacts or soldered surfaces.

Solder splash on components occurs especially during automated configuration of circuit boards with SMD components using a so-called "pick-and-place" process. Coating with paints containing solvents or other coatings has not produced satisfactory results in this regard.

The task of the invention is to produce an electronic component for which the adhesion of solder splash or solder itself to surfaces not intended for soldering is prevented to the greatest extent possible. In particular, such a surface-mountable component is to be developed that may be packed in belts and subsequently used by conventional pick-and-place processes of SMT[1] technology.

Further, a method for the production of such components is to be described.

The solution of this task is achieved by a component possessing the characteristics of Patent Claim 1, by a method possessing the characteristics of Patent Claim 8, and with a coating medium possessing the characteristics of Patent Claim 15.

Advantageous configurations and embodiments are the subjects of Patent Claims 2 through 7, 9 through 14, or 16 through 25.

According to the invention, the plastic housing (except for the metallic soldering contacts) is covered with a coating that prevents solder adherence (hereafter, anti-solder coating).

In order to prevent the occurrence of solder splash in the form of small solder accumulations on electronic component surfaces not intended for soldering, particularly during immersion in a solder bath or during solder flood processes, the invention suggests an anti-solder coating on the electrical component surfaces not intended for soldering that prevents solder adherence.

In a particularly advantageous embodiment of the invention, the anti-solder coating essentially consists of siloxane.

Accordingly, an anti-solder coating comprised of siloxane based on a polyether- modified dimethyl-polysiloxane is especially preferred.

Accordingly, the anti-solder coating is preferably applied using a 0.01 – 5% hydrous solution, especially using a 0.01 – 2.5% hydrous solution, that preferably contains no other solvent compounds. Using a 0.01 – 2.5% hydrous solution, non-adhesion to the coating is advantageously ensured, which is of decisive importance during pick-and-place processes used in surface-mounting techniques.

In a particularly preferred embodiment of the invention, application of the anti-solder coating is performed at room temperature.

The thickness of the anti-solder coating, particularly for electro-optical transmitting and/or receiving components, is most preferably less than 3 μm, and renders as a result virtually no influence on the optical characteristics of the coated components.

Based on the invention, a highly-effective homogenous anti-solder coating is created that advantageously involves no viscous intermediary solution, thanks to its special chemical structure and by the use of hydrous systems. A special advantage to this is that no environmentally damaging solutions are used. Also, no residual droplets from highly-volatile

[1] Translator's Note: SMT is probably a typo for SMD.

intermediary solutions are produced that may make proper soldering of the electrical component difficult or impossible. The thermal post-processing step formerly used is no longer required, thus allowing an increase in production output and a reduction in production time. There are no functional effects on the coated components. The coatings produced are further distinguished by long shelf life and homogeneity, thus increasing component quality and reducing the number of rejects.

Further, the invention relates to a coating medium for the reduction of solder splash on surfaces of a multi-surface electrical component not intended for soldering but containing at least one surface for soldering, whereby the coating is applied to the surfaces not intended for soldering, and whereby the coating is a siloxane.

Accordingly, based on a further embodiment of the invention, the coating medium consists of a polyether-modified dimethyl-polysiloxane.

The coating medium is advantageously dissolved in a 0.01 – 5% hydrous solution (preferably in a 0.01 – 2.5% hydrous solution) for application onto a surface provided for this purpose without the use of any other additional solvent compounds. Thus, after application of the coating medium and evaporation of the water from the hydrous solution, an even disposition of the coating medium is ensured without any other hard-to-evaporate solvent residue being left behind. An advantage of this is that use of a hydrous solution does not require the use of environmentally damaging solvents. The coating medium shows no typical coloration or residue on the component surface resulting from thermal decomposition reactions that formerly resulted from the necessary heat treatment that caused the solution to evaporate.

The hydrous solution is preferably applied to the entire housing of the component using stamping (e.g., using a tampon, roller, or sponge), immersion (using a dipping bath), spraying, or application with a micro-dosing process using fine needles. A potentially brief exposure time of between preferably about 1 second and 30 seconds using the hydrous solution based on the invention advantageously prevents damaging intrusion of the solution into the plastic housing to the greatest extent possible. Thus, mechanical damage within the plastic housing during the soldering process and during operation, such as delamination, for example, is reduced.

The film is advantageously dried in a stream of air that need not be at an increased temperature.

Use of a hydrous solution without additional solvents greatly prevents emissions hazardous to health. The coating material further shows a low potential for hazard to man and environment, particularly a low vapor pressure. Used coating solutions may be subsequently disposed of without difficulty, and coated components may be used in particularly critical application fields such as automotive interiors, consumer electronics, and medical care because of the low vapor pressure.

Buffered coating solutions with a pH value between about 5.0 and 7.0 may advantageously be stored for up to three months for subsequent use.

The anti-solder coating is advantageously very stable with respect to light, and this factor may be further increased by the addition of light shielding media and UV absorbers (e.g., benzophenone, benzoriazole, steric-retarded amines with pH advantageously between 6.0 and 7.5), whereby the radiation and weathering stability of the plastic housing are increased. The coating is also advantageously suited for electro-optical components with intensive and/or high-energy radiation output, such as LED's and high-output LED's that emit blue light and UV radiation.

The coating solutions are preferably applied to thermoplastic housings made of LCP, PBT, PET, PC, PA, and/or especially preferred polyphthalamide with or without filler material (e.g., titanium oxide, silicon oxide, aluminum oxide, etc.) and/or epoxy resin-, silicon-, or acrylate cast materials (advantageously epoxy anhydride cast materials). The epoxy resin, silicon- or acrylate cast materials may contain diffuser materials such as calcium fluoride, barium sulfate, silicon oxide, aluminum oxide, glass globes, etc., or luminescence-converting pigments.

Further advantages, special properties, and useful embodiments of the invention may be taken from the sub-claims and from the embodiment example explained by the illustrations below.

These illustrations include the following:

Figure 1 shows a schematic cross-section view of an embodiment example of a soldered electrical component with an anti-solder coating according to the invention; and

Figure 2 shows a schematic cross-section view of a soldered, conventional electrical component with solder splash.

Figure 1 shows a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component 1 in soldered condition. The metallic soldering areas 4 of component 1 are soldered to the conductors 8 printed on the circuit board 7 using solder 3. The other areas 5 of the surface 2 of a plastic housing 14 of the component 1 that are not intended for soldering are covered by an anti-solder coating 6. Moistening of the surfaces 5 of the plastic housing 14 with solder is almost completely prevented by the use of polyether-modified dimethyl polysiloxane as the main ingredient of the anti-solder coating 6 according to the invention.

Figure 2 shows schematically such undesired moistening or adherence 10, 11, 12, and 13 by solder 3 to unintended surfaces 5 of a housing 14 of a conventional surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component 1 without anti-solder coating. The component 1 is again shown in soldered condition. The metallic soldering areas 4 of component 1 are again soldered to the conductors 8 printed on the circuit board 7 using solder 3. Now scattered adhesion of solder splash 10 (solder, flux, etc.) occurs from raw or lightly moistenable points, such as for example the lens of a LED, including adhesion of solder splash 11 in angles or corners of the surface 2 of the component 1, as well as overhang of solder 12 that arises as a result of partial moistening of the areas 5 not intended for soldering, and also short-circuiting solder bridges 13 that arise from the converging solder 3 on the surface 2 between individual contact or solder surfaces 4.

A hydrous solution of the anti-solder coating material is preferably applied using stamping (e.g., using a tampon, roller, or sponge), immersion (using a dipping bath), spraying, or application using a micro-dosing process with fine needles to the entire surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component. A brief potential exposure period to the

hydrous solution of between 1 and 30 seconds based on the invention advantageously almost completely prevents a damaging intrusion of the solution into the plastic housing. Thus, mechanical damage within the plastic housing during the soldering process and during operation (such as delamination, for example) may be reduced.

The film is advantageously dried in a stream of air that need not operate at an increased temperature.

According to the invention, the hydrous solution of the polyether-modified dimethyl-polysiloxane consists of 0.1 – 5% polyether-modified dimethyl-polysiloxane, such as for example BYK348 made by Byk-Chemie GmbH, and deionized water. This achieves an optimal dry lead frame and a homogenously-coated housing without the use of special masks or other auxiliary means.

Avoidance of special heat treatment for drying purposes or for the purpose of homogenization of the coating is especially advantageous. In this manner, higher volume output and more rapid production are achieved.

The anti-solder coating preferably contains a light shielding medium and an UV absorber (e.g., benzophenone, benzoriazole, steric-retarded amines with pH preferably between 6.0 and 7.5), whereby the radiation and weathering stability of the plastic housing are increased.

Patent Claims

1. Electronic component, particularly a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1), with a plastic housing (10) that includes at least one metallic soldering area (4), characterized in that the surface of the plastic housing (10), except for the metallic soldering area (4), is at least partially covered by an anti-solder coating (6).

2. Electronic component as in Claim 1, characterized in that the anti-solder coating (6) essentially consists of siloxane.

3. Electronic component as in Claim 1 or 2, characterized in that the anti-solder coating (6) essentially consists of polysiloxane.

4. Electronic component as in one of the previous Claims, characterized in that the anti-solder coating (6) is essentially based on methyl-polysiloxane.

5. Electronic component as in one of the previous Claims, characterized in that the anti-solder coating (6) is essentially based on dimethyl-polysiloxane.

6. Electronic component as in one of the previous Claims, characterized in that the anti-solder coating (6) is essentially based on polyether-modified dimethyl-polysiloxane.

7. Electronic component as in one of the previous Claims, characterized in that the plastic housing (14) contains a radiation-emitting and/or radiation-detecting semi-conductor element that is embedded in transparent plastic for the emitted and/or received radiation.

8. Process [for] production of an electronic component, particularly a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1) with a plastic housing (14) that includes at least one metallic soldering area (4), characterized in that only the plastic housing, or a portion of the plastic housing, is covered with an anti-solder coating (6) that essentially consists of siloxane, and that is applied to the plastic housing (14) in a hydrous solution not containing any other additional solvents.

9. Process according to Claim 8, characterized in that a 0.01 – 5% hydrous solution of the material forming the anti-solder coating (6) is used.

10. Process according to Claim 9, characterized in that a 0.01 – 2.5% hydrous solution of the material forming the anti-solder coating (6) is used to create as non-adhesive an anti-solder coating as possible.

11. Process according to Claim 8, 9, or 10, characterized in that the entire surface of the housing (14) including the soldering areas (4) is covered by the hydrous solution, particularly by immersion, spraying, dripping, and/or by means of a sponge or similar.

12. Process according to Claim 10, characterized in that the exposure time for the coating is between approximately 1 second and approximately 30 seconds.

13. Process according to one of Claims 8 through 11, characterized in that the hydrous solution is applied at room temperature, and that subsequent drying occurs in air without a thermal post-processing step.

14. Process according to one of Claims 8 through 12, characterized in that the hydrous solution is used with a phosphate buffer medium at a concentration of from 0.01 mmol/liter to 0.1 mmol/liter.

15. Process according to one of Claims 8 through 13, characterized in that the hydrous solution includes a fungicide.

16. Coating medium used to reduce solder splash on surfaces (5) not intended for solder on an electronic component with several surfaces, especially a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1), with a plastic housing (14) that includes at least one metallic soldering area (4), whereby the coating medium (9) is essentially a siloxane.

17. Coating medium according to Claim 15, whereby the coating medium (9) is a siloxane.

18. Coating medium according to Claim 16, whereby the coating medium (9) is a methyl-polysiloxane.

19. Coating medium according to Claim 17, whereby the coating medium (9) is a dimethyl-polysiloxane.

10. Process according to Claim 9, characterized in that a 0.01 – 2.5% hydrous solution of the material forming the anti-solder coating (6) is used to create as non-adhesive an anti-solder coating as possible.

11. Process according to Claim 8, 9, or 10, characterized in that the entire surface of the housing (14) including the soldering areas (4) is covered by the hydrous solution, particularly by immersion, spraying, dripping, and/or by means of a sponge or similar.

12. Process according to Claim 10, characterized in that the exposure time for the coating is between approximately 1 second and approximately 30 seconds.

13. Process according to one of Claims 8 through 11, characterized in that the hydrous solution is applied at room temperature, and that subsequent drying occurs in air without a thermal post-processing step.

14. Process according to one of Claims 8 through 12, characterized in that the hydrous solution is used with a phosphate buffer medium at a concentration of from 0.01 mmol/liter to 0.1 mmol/liter.

15. Process according to one of Claims 8 through 13, characterized in that the hydrous solution includes a fungicide.

16. Coating medium used to reduce solder splash on surfaces (5) not intended for solder on an electronic component with several surfaces, especially a surface-mountable radiation-emitting and/or radiation-sensitive electro-optical component (1), with a plastic housing (14) that includes at least one metallic soldering area (4), whereby the coating medium (9) is essentially a siloxane.

17. Coating medium according to Claim 15, whereby the coating medium (9) is a siloxane.

18. Coating medium according to Claim 16, whereby the coating medium (9) is a methyl-polysiloxane.

19. Coating medium according to Claim 17, whereby the coating medium (9) is a dimethyl-polysiloxane.

20. Coating medium according to Claim 18, whereby the coating medium (9) is a polyether-modified dimethyl-polysiloxane.

21. Coating medium according to one of Claims 12 through 19, whereby the coating medium (9) is dissolved in a 0.01 – 5% hydrous solution without other solvents for application to a surface intended to receive it.

22. Coating medium according to Claim 20, whereby the hydrous solution contains a phosphate buffer medium at a concentration of from 0.01 mmol/liter to 0.1 mmol/liter.

23. Coating medium according to Claim 20 or 21, whereby the hydrous solution includes a fungicide.

24. Coating medium according to according to one of Claims 12 to 22, whereby the hydrous solution, and as a result, the finished anti-solder coating (6), includes an anti-corrosion medium.

25. Coating medium according to one of Claims 12 to 23, whereby the hydrous solution has a pH value of between approximately 5.0 and approximately 7.0.

26. Coating medium according to one of Claims 12 to 24, whereby the hydrous solution, and as a result, the finished anti-solder coating (6), includes a light shielding medium and/or UV absorber, preferably at a concentration up to 1%.

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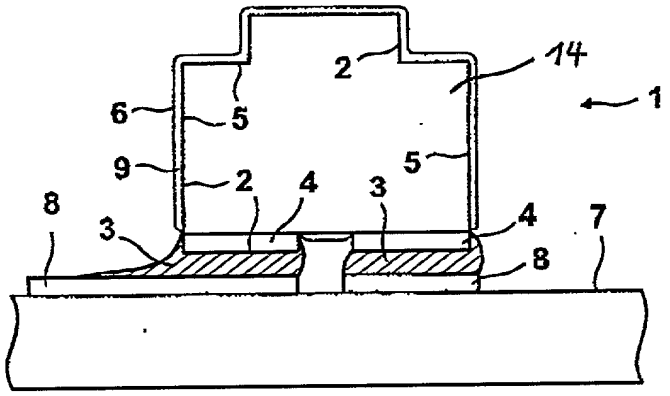

Fig 1

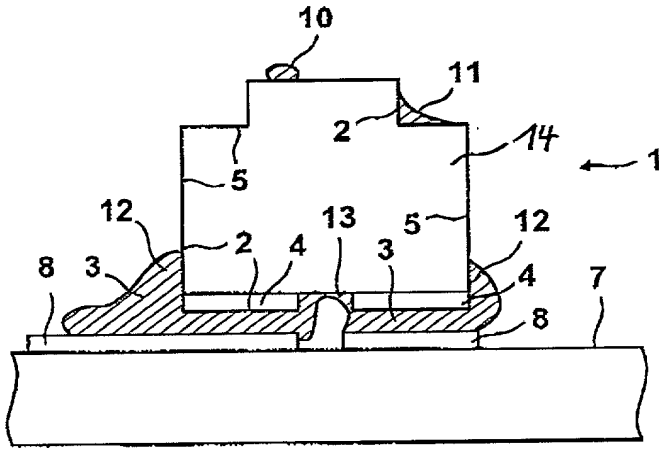

Fig 2

#3

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled ELECTRONIC COMPONENT AND COATING MEDIUM, the specification of which:

[X] was filed on April 20, 2001 as Application Serial No. 09/830,038 and
[X] was described and claimed in PCT International Application No. PCT/DE00/03290 filed on September 21, 2000.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information I know to be material to patentability in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim the benefit under Title 35, United States Code, §119(e)(1) of any United States provisional application(s) listed below:

U.S. Serial No.	Filing Date	Status

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information I know to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

U.S. Serial No.	Filing Date	Status

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

Country	Application No.	Filing Date	Priority Claimed
Germany	199 45 131.1	September 21, 1999	[X]Yes [] No

Combined Declaration and Power of Attorney

I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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Boston, MA 02110-2804

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

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1-00

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Inventor's Signature: Klaus Höhn Date: 6. Juli 2001

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